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Clifford S. Mitchell, MD, MS, MPH  
Director, Environmental Health Bureau  
Prevention and Health Promotion Administration  
Maryland Department of Health and Mental Hygiene  
201 West Preston Street, Room 327  
Baltimore, MD 21201  
Via Email

**RE: Review of Scoping Report**

Dear Dr. Mitchell:

Thank you for the opportunity to review the “Detailed Scoping Report: Potential Public Health Impacts of Natural Gas Development and Production in the Marcellus Shale in Western Maryland.” I have endeavored to identify “issues omitted from the Scoping Document which the Contractor feels should be considered for inclusion as part of a public health assessment of the potential impacts of development of the Marcellus Shale in Maryland.”

My comments in this letter use the term unconventional natural gas development (UNGD) as opposed to the terms used in the report, i.e., “high volume hydraulic fracturing (HVHF)” or “extraction using horizontal drilling.” I suggest the Scoping Report adopt the term UNGD (or something similar) that encompasses the entire life cycle of production: site selection, site preparation, directional drilling, fracturing, well and related infrastructure development, production maintenance, and post-production land reclamation. This is important because hydraulic fracturing is just one relatively short step in the natural gas development process and the potential public health impacts are not limited to any one step in the life cycle. Furthermore, a focus on the fracturing or drilling processes diverts attention from the potential public health impacts of the larger process over the decades during which production may exist.

In developing this letter, I have reviewed the Draft Scoping Document and the public comments from the stakeholders. Based on my experience with UNGD and review of these documents you provided I have made what I think are constructive suggestions that can be done within the timeline and resource limitations. My comments are organized along the lines of Section 5 of the Scoping Report.

**Comments on Section 5: Scope of Public Health Assessment**

Overall, I believe the Draft Scoping Report identifies the main issues that are likely to affect public health in Western Maryland. I have some suggestions that I believe will help tighten the focus the report and address issues that are likely to be important to the public.

**Comments on Section 5.1/5.1.1: Baseline Assessment**

At the bottom of page 16 there is a list of population factors, but additional detail is needed to insure that all potential pathways and health-relevant factors are addressed at both Baseline and in the subsequent Impact Assessment. In this section the process of UNGD should be described using a pathway framework (e.g., air, water, etc.) so that specific stressors and UNGD processes can be linked to individuals with the highest likelihood of exposure over the timescale of development. While “proximity to existing [vertical] wells” is useful, other major potential sources of air and/or water pollution should be considered here as well, particularly since many of the pollutants emitted have multiple sources that are not exclusive to UNGD (e.g., methane, volatile organic compounds, others). Furthermore, “well water as a drinking water source” should be “drinking water source” as UNGD can potentially affect both surface and ground water.

The report will address 3 major sources of morbidity and mortality: asthma and COPD, cancer, and cardiovascular disease. These are relatively common outcomes, and detection of changes in these outcomes relative to baseline depends on statistical power. This section should frame this baseline investigation in terms of potential power to detect a change based not just on current population, but also the likely future population at a defined future point in time relevant to the UNGD process in Western Maryland. A quick scan of census data indicates that the current population of these two counties is ~100,000. While I have not done a formal power analysis, one would expect that only the most common sources of mortality and morbidity could be explored in a population of this size. Given how common accidents and injuries are in the US, and their potential link to UNGD, I would think those outcomes should be part of the baseline assessment of mortality and morbidity. Inclusion of any other outcomes should be based on both public interest and the likelihood of being able to detect a change in baseline or future populations of the region.

**Comments on 5.1.2: Impact Assessment**

The 10 main issues identified for inclusions in the Impact Assessment starting on page 19 of the Draft Scoping Report -- namely, Air Quality, Water Quality, Noise, Public Safety, Social Determinants of Health, Cumulative Exposures, Specific Vulnerable Populations, Baseline Monitoring and Assessment -- are reasonable categories that cover the main issues with the caveats noted below. The authors should clarify these categories and be precise about what each of these terms include, and, more importantly, specifically exclude. This will make the Scoping Report both more comprehensive and precise. There are some additional potential hazards that are not explicitly identified in the Draft Scoping Document that experience in Colorado and other states suggest are important to address. I have summarized these in my comments below, which are organized by the categories presented in the Draft Scoping Document:

- Air Quality: 1) An emerging scientific literature suggests that air quality is affected by not just drilling and production but also maintenance of wells and related infrastructure, e.g., compressor stations, condensate tanks, and pipelines, which are all major sources of episodic emissions of methane, volatile organic compounds and other production-related

pollutants; 2 ) Community concerns about odors stemming from UNGD should be addressed under this heading, as this is frequently one of the main issues that state and local environmental health departments must address; 3) Define more clearly what “upset” conditions are and how these relate to catastrophic risk from a major systems failure, e.g., a well blow out (this comment also applies to Public Safety).

- Water Quality: 1) Define more clearly what “upset” conditions are and how these relate to catastrophic risk from a major systems failure, e.g., breakdown of water handling systems; 2) Note that both ground and surface water can be affected by spills and leaks from not just the wells themselves but also from pipelines, water handling systems, and related infrastructure.
- Noise: Use the term “Physical Hazards” to encompass injury, noise, light, vibration, and radiation hazards. While noise is an important issue, experience suggests noise, injuries (particularly in workers), odors, and NORM (Naturally Occurring Radioactive Materials) are often issues of public concern that the Impact Assessment should acknowledge.
- Public Safety: In addition to the issues noted in the Draft Scoping Report, link this section to the potential system failures noted for air and water as well as to spills and leaks that may lead to emergency response.
- “Impact of Associated with (sic) Cumulative Exposures”: Define more clearly what these exposures encompass. If it includes physical, chemical, and psychosocial stressors, how are these measured and used in the Impact Assessment
- Baseline monitoring: “Gap analysis” should be defined clearly and/or retitled “Limitations and Data Needs”

I agree with the decision to exclude Economic, Climate Change, and Occupational Health from this initial Scoping Report as separate focus areas, though as noted in the draft, Occupational Health should be a major subsection within both the Baseline and Impact Assessment. Assessing the positive and negative economic effects of UNGD are important but outside the scope of a this report. Similarly, the science on the cumulative effects of UNGD development on climate is important but still emerging, and the additional impact of development in Western Maryland on global climate systems is beyond the scope of this report.

Apart from these issues, I want to address three broad themes that I think are important components of the overall analysis: Models, Limitations, and Communication of your findings.

Use of Models: Given the nature of this project it is clear that models will play an important part in developing projections on which to base comparisons over time. The Draft Scoping Report should be explicit about the projections it intends to make and how existing data will be used to make these projections. While GIS-based approaches are appropriate for the existing data, it is important to identify the other models (if any) that might be used project future air and water quality, for example.

Limitations: Given the limited resources available to conduct the analysis it is important to be very clear on the scope of the assessment. This includes explicitly identifying issues that will not be addressed in this report. It is also important to highlight not just the strengths and limitations of data to be used, but also how uncertainties will be identified and addressed.

Communication of Results: The authors should use care with language in the report: the terms “Baseline Assessment” and “Impact Assessment” are used throughout the report, but not always consistently. Given the great public interest in this process the authors should be clear what each of these encompass and how they are different from the more formal process of “Health Impact Assessment” as recently outlined by the Natural Research Council<sup>1</sup>. The communication plan for the Scoping Report should be a high priority as the effort involved in doing this well is often underestimated. While the web site and social media are important parts of the dissemination of the results of this work, the authors should prepare a communication plan with main messages and be prepared to do in-person public outreach so they may clearly communicate their main messages.

### **Conclusions**

The lack of substantive research to address the main public health concerns about UNGD is still one of the major limitations facing both public health experts and decision-makers. This uncertainty means that it is likely that there will be unanticipated outcomes – history shows that even the best prepared miss something important.

If UNGD development goes forward in Western Maryland the approach outlined in the Scoping Report represents a viable strategy for exploring potential health impacts. Prevention of impacts will, however, require an ongoing, substantive dialogue between the public, NGOs, government, and industry to address stakeholder concerns.

In closing, thank you for the opportunity to review the Draft Scoping Document, and please contact me if you have questions.

Sincerely,



John L. Adgate, PhD, MSPH  
Professor and Chair  
Department of Environmental and Occupational Health  
Colorado School of Public Health

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<sup>1</sup> *Improving Health in the United States. The Role of Health Impact Assessment, National Academies Press, 2011.*